Fishery Data Series No. 01-15

Production of Coho Salmon from Slippery Creek, 1999–2000

by

Dean E. Beers

November 2001

Alaska Department of Fish and Game **Division of Sport Fish**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used in Division of Sport Fish Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications without definition. All others must be defined in the text at first mention, as well as in the titles or footnotes of tables and in figures or figure captions.

Weights and measures (metric)

Centimeter	cm
Deciliter	dL
Gram	g
Hectare	ha
Kilogram	kg
Kilometer	km
Liter	L
Meter	m
metric ton	mt
Milliliter	ml
Millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
Foot	ft
Gallon	gal
Inch	in
Mile	mi
Ounce	oz
Pound	lb
Quart	qt
Yard	yd

Spell out acre and ton.

Time and temperature

Day	d
degrees Celsius	°C
degrees Fahrenheit	°F
hour (spell out for 24-hour clock)	h
Minute	min
Second	s

Spell out year, month, and week.

Physics and chemistry

all atomic symbols	
alternating current	AC
Ampere	A
Calorie	cal
direct current	DC
Hertz	Hz
Horsepower	hp
hydrogen ion activity	pH
parts per million	ppm
parts per thousand	ppt, ‰
Volts	V
Watts	W

General

All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.
All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.
And	&
At	@
Compass directions:	
East	E
North	N
South	S
West	W
Copyright	©
Corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
et alii (and other people)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.,
id est (that is)	i.e.,
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
number (before a number)	# (e.g., #10)
pounds (after a number)	# (e.g., 10#)
registered trademark	®
Trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S. state and District of Columbia abbreviations	Use two-letter abbreviations (e.g., AK, DC)

Mathematics, statistics, fisheries

alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	F, t, χ^2, etc.
confidence interval	C.I.
correlation coefficient	R (multiple)
correlation coefficient	r (simple)
covariance	cov
degree (angular or temperature)	°
degrees of freedom	df
divided by	÷ or / (in equations)
equals	=
expected value	E
fork length	FL
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
mideye-to-fork	MEF
minute (angular)	'
multiplied by	x
not significant	NS
Null hypothesis	H_O
Percent	%
Probability	P
Probability of a type I error (rejection of the null hypothesis when true)	α
Probability of a type II error (acceptance of the null hypothesis when false)	β
Second (angular)	"
Standard deviation	SD
Standard error	SE
Standard length	SL
Total length	TL
Variance	var

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by

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ABSTRACT

Recovery in 2000 of coded wire tags from adult coho salmon tagged as smolts in 1999, and an adult escapement project, were used to estimate smolt abundance, harvest, exploitation rate, and production of coho salmon *Oncorhynchus kisutch* from Slippery Creek, on Kuiu Island in Southeast Alaska. From 28 April through 1 June 1999, a smolt trap was operated below the outlet to Slippery Lake. During this period 12,956 coho salmon smolt ≥70 mm fork length were tagged and released alive with valid tags with tag code 04-50-09. In 2000, 242 adult coho salmon bearing coded wire tags of Slippery Creek origin were recovered from sampling marine fisheries, and correspond to an estimated marine harvest of 2,193 (SE = 146) fish. Of this harvest, the troll fishery took an estimated 75.6%, net fisheries took 22.9%, and recreational fisheries 1.5%. From 15 August to 25 October the escapement of adults past the fish pass trap in 2000 was 411. Estimated total run (escapement plus harvest) in 2000 for coho salmon originating from Slippery Creek is 2,604 (SE = 146); marine exploitation rate on this run is an estimated 84.2% (SE = 0.9%). Estimated smolt abundance in 1999 from Slippery Creek was 31,015 (SE = 2,766) and marine survival rate of coho salmon smolt from Slippery Creek is an estimated 8.4% (SE = 0.9%).

Key words: coho salmon, *Oncorhynchus kisutch*, Slippery Creek, fish pass, harvest, troll fishery, drift gillnet fishery, recreational fishery, seine fishery, escapement, migratory timing, production, exploitation rate, marine survival

INTRODUCTION

Slippery Creek produces about 3,000 adult coho salmon *Oncorhynchus kisutch* annually, most of which are caught in commercial troll and seine fisheries in central Southeast Alaska. Assessment of the Slippery Creek stock is part of the Alaska Department of Fish and Game's (ADF&G) effort to gather information on coho salmon regionwide for in-season and post-season management of the mixed-stock and terminal coho salmon fisheries in Southeast Alaska. The Slippery Creek project is the department's only coho salmon stock assessment program for a lake system between Auke Lake in Juneau and Hugh Smith Lake in Ketchikan.

In 1987 the U.S. Forest Service (USFS) constructed an Alaska steeppass (Zeimer 1962) at the lower end of the creek that allowed migrations into previously inaccessible habitat upstream (Figure 1). The USFS, ADF&G and Northern Southeast Regional Aquaculture Association, Inc (NSRAA) enhanced the system for coho salmon with nearby wild stocks in 1987 (Wright, Bryant and Frenette 1997). The USFS and ADF&G continued to enhance the system with Crystal Lake hatchery brood stock from 1988 to 1990.

Stock assessment began in 1997 when the USFS constructed and operated a smolt trap at a weir below the lake outlet and placed CWTs in 33,077 coho smolts. Beers (1999) counted the 1998 escapement, and estimated the size of the 1997 smolt emigration and other population parameters (Table 1). ADF&G operated the smolt trap in 1999 to continue tagging coho salmon smolts, and enumerated the escapement and estimated the fraction returning with CWTs in 2000. The project is very cost-effective because the smolt trap, adult fish pass, and crew living quarters are provided by the USFS.

Objectives of this study in 2000 were to estimate: (1) escapement; (2) ocean harvest; and (3) age, sex, and length compositions of the 1999 emigrant smolt population and the 2000 escapement.

METHODS

SMOLT CAPTURE AND CODED WIRE TAGGING

Salmon smolt emigrating from Slippery Creek were captured using a "Wolf" smolt trap (Wolf 1956) from 28 April to 1 June 1999 (Figure 2). The trap was reconstructed by ADF&G about a ½ mile below the lake outlet. Vexar panels with an average mesh diameter of 0.26 inch were used as

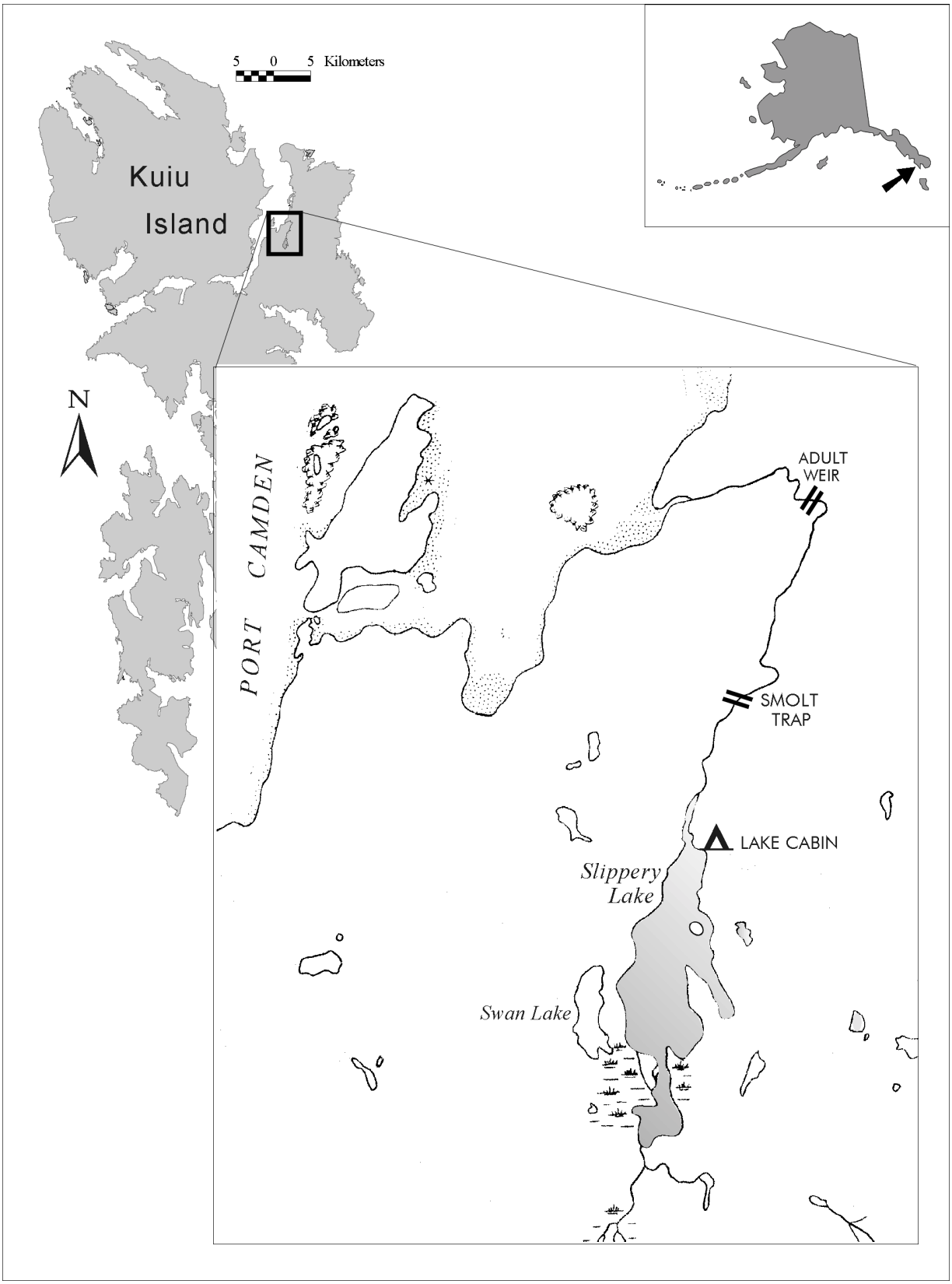

Figure 1.–Slippery Creek drainage on Kuiu Island, Southeast Alaska.

Table 1.–Estimated coho salmon smolt production ($\hat{N}_s$), number of valid CWTs released (n_s), fraction of adults carrying CWTs ($\hat{\theta}_a$), adult harvest ($\hat{H}$) and exploitation rate ($\hat{\mu}$), smolt-to-adult survival ($\hat{S}$), total adult return ($\hat{N}_r$) and escapement (N_e) at Slippery Creek, 1997–98.

Smolt/adult year	$\hat{N}_s$	n_s	$\hat{\theta}_a$	$\hat{H}$	$\hat{\mu}$	$\hat{S}$	$\hat{N}_r$	N_e
1997–1998[a]	43,544	33,077	75.9%	2,932	82.3%	8.2%	3,564	632

[a] Beers (1999).

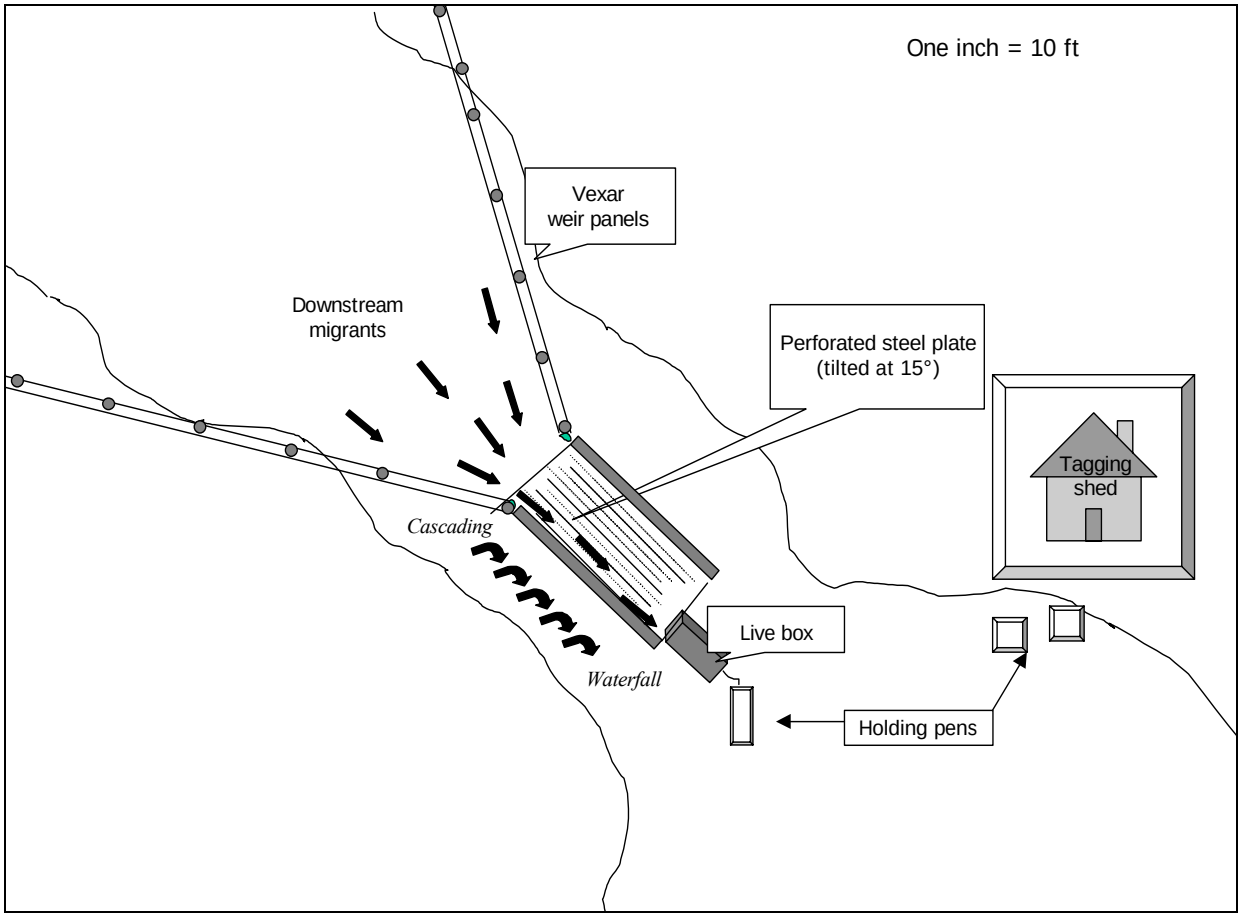

Figure 2.–Design of Slippery Creek smolt trap.

leads to funnel fish downstream to the heart of the trap, a large perforated aluminum panel dewatering table embedded in the middle of the creek. The tilted table allowed most of the water above it to pass freely through, while directing the remaining water and trapped emigrant smolt to a baffled live box and holding pen below the structure.

Each morning salmonid smolt were removed from the trap, transported to holding pens next to the tagging shed, and processed. Coho smolt were separated by inspection from other species of salmon, trout and Dolly Varden *Salvelinus malma* using a combination of external morphological characteristics (McConnell and Snyder 1972). All live coho salmon smolt ≥70 mm FL were tranquilized in a buffered solution of tricain-methane sulfonate (MS 222). The solution was buffered with sodium bicarbonate until the pH was neutral. All fish were tagged with a full length coded wire tag and marked by excision of the adipose fin, following methods in Koerner (1977), and released (except those held for tag retention testing).

One hundred (100) coho salmon smolts from each day's tagging were held overnight in a pen and checked for retention of CWTs and tagging mortality. The number of fish tagged, number of tagging-related mortalities, and number of fish that had shed their tags were compiled and recorded on *ADF&G CWT Tagging Summary and Release Information Forms* which were submitted to the Commercial Fisheries Division Tag Lab in Juneau when field work ended.

SMOLT ABUNDANCE AND AGE

Two contingency tables (χ^2 tests) were used to determine if smolt sampling at the weir was size/age selective. One test compared the number of smolt sampled by age (and given CWTs) with the number of adults sampled with CWTs by age, to determine if sampling at the weir was age/size selective. The second test compared numbers of smolt and adults sampled at age to determine if the first event was selective. Because larger (age 2.) smolts were more likely to be captured and marked than smaller (age 1.) fish, the samples were classified by freshwater age class. The modified Petersen estimator for a closed population (Seber 1982) was then used to estimate abundance by age ($\hat{N}_{s,age}$) and the results summed to estimate total emigration:

$$\hat{N}_s = \frac{\hat{n}_{s1}(n_{e1}+1)}{(m_{e1}+1)} + \frac{\hat{n}_{s2}(n_{e2}+1)}{(m_{e2}+1)} - 2 \qquad (1)$$

$$\hat{n}_{sa} = n_s \, \hat{p}_{sa} \qquad (2)$$

$$\hat{p}_{sa} = n_a / n \qquad (3)$$

where n_s is the number of smolt marked with an adipose finclip during 1999, $\hat{p}_{sa}$ is the proportion of the smolt emigration estimated to be of age a, n_a and n are the numbers of age a and aged smolt sampled at the weir, $\hat{n}_{sa}$ is the subset of n_s estimated to have been of age a, n_{ea} is the number of adult salmon examined at the weir in 2000 that were age a, and m_{ea} is the subset of n_{ea} that were missing adipose fins.

Variance, bias, and confidence intervals for $\hat{N}_s$ were estimated with modifications of bootstrap procedures in Buckland and Garthwaite (1991). Coho salmon captured at the weir were divided according to their capture histories by age (Table 2). A bootstrap sample was then drawn with replacement from a sample of size $\hat{N}_s$ using the empirical distribution defined by the capture histories.

A new set of statistics was generated from each bootstrap sample (i.e., $\{\hat{n}_1^*, n_2^*, m_2^*\}$ for each age), along with new estimates of abundance by age ($\hat{N}^*_{s,age}$) and the smolt population total ($\hat{N}^*_s$). Ten thousand such bootstrap samples were drawn, creating empirical distributions of $\hat{F}(\hat{N}^*_{s,age})$ and $\hat{F}(\hat{N}_s^*)$, which are estimates of $\hat{F}(\hat{N}_{s,age})$ and $\hat{F}(\hat{N}_s)$. The difference between the average $\hat{N}_s^*$ of bootstrap estimates and $\hat{N}_s$ is an estimate of statistical bias in the latter statistic (Efron and

Table 2.–Capture histories for the population of coho salmon smolt marked in Slippery Creek in 2000 by freshwater age (notation explained in text)**.**

Capture history	Age 1	Age 2	Source of statistics
Marked and not captured at weir	7,030	5,843	$\hat{n}_1 - m_2$
Marked and captured at weir	51	32	m_2
Not marked, but captured at weir	96	60	$n_2 - m_2$
Not marked and not captured at weir	12,978	4,958	$\hat{N}_s - \hat{n}_1 - n_2 + m_2$
Effective population for simulations	20,154	10,861	$\hat{N}_s$

Tibshirani 1993, Section 10.2). Confidence intervals were estimated from $\hat{F}(\hat{N}_{s,age})$ and $\hat{F}(\hat{N}_s^*)$ with the percentile method (Efron and Tibshirani 1993, Section 13.3). Variance was estimated as

$$\text{var}(\hat{N}_s^*) = (B-1)^{-1}\sum_{b=1}^{B}(\hat{N}_{s(b)}^* - \overline{\hat{N}}_s^*)^2 \qquad (4)$$

where B is the number of bootstrap samples.

HARVEST

Harvest in 2000 of coho salmon originating from Slippery Creek in 1999 was estimated by sampling catches in commercial and recreational fisheries and from the escapement into Slippery Creek. Because several fisheries exploited coho salmon over several months in 2000, harvest was estimated over several strata, each a combination of time, area, and type of fishery. Statistics from the commercial troll fishery were stratified by fishing period and by fishing quadrant. Statistics from commercial net fisheries were stratified by week and by fishing district. Statistics from the recreational fishery were stratified by fortnight. Oliver (1990) and Hubartt et al. (1997) present details of sampling commercial and recreational fisheries, respectively.

Estimates of harvest $\hat{r}_i$ were calculated for each stratum, then summed across strata and across fisheries to obtain an estimate of the total $\hat{T}$:

$$\hat{r}_i = \hat{H}_i\left(\frac{m_{ij}}{\lambda_i k_i}\right)\theta^{-1} \qquad (5)$$

$$T = \sum_i r_i \qquad (6)$$

$$\text{var}[\hat{T}] = \sum_i \text{var}[\hat{r}_i] \qquad (7)$$

where $\hat{H}_i$ is the estimated harvest of the cohort in stratum i, $\hat{\theta}$ is the fraction of the cohort marked with CWTs (from sampling adults at the trap), k_i is the subset of $\hat{H}_i$ examined for missing adipose fins, m_i is the number of decoded CWTs recovered, and $\lambda_i = (a_i' t_i')/(a_i t_i)$ is the decoding rate for CWTs from recovered salmon. See Bernard and Clark (1996) for further details. Variance of $\hat{r}_i$ was estimated using the appropriate large-sample formulations in Bernard and Clark (1996, their Table 1) for a wild stock harvested in recreational and commercial fisheries. Variance of the sum of estimates was estimated as the sum of variances because sampling was independent across strata and fisheries.

ESCAPEMENT

In 2000, from 15 August to 25 October, total immigration of adult coho salmon into Slippery Creek was determined by counting each coho salmon past a 4-ft-wide picket trap located at the head of a wooden debris deflector at the top of Slippery Creek fish pass. Adults were checked for a missing adipose fin and also checked for the presence of a coded wire tag by using a magnetometer to estimate tag loss.

The age, length, and sex of the escapement were estimated:

$$\hat{p}_i = \frac{w_i}{w} \tag{8}$$

$$\text{var}[\hat{p}_i] = \left[1 - \frac{w}{N_e}\right] \frac{p_i(1-\hat{p}_i)}{w-1} \tag{9}$$

where N_e is escapement count at the trap, w is the number aged, and w_i is the subset of w that belong to age, length, or sex group i. Proportional sampling of every other adult coho passing the trap was used to eliminate bias from in-season changes in age, length, or sex composition. Estimates of mean length at age and its variance were calculated using standard procedures.

RUN SIZE, EXPLOITATION RATE, MARINE SURVIVAL

Estimates of total run size (harvest plus escapement) of coho salmon returning to Slippery Creek above the trap in 2000 is the sum of the estimated harvest (T) and escapement (N_e):

$$\hat{N}_R = \hat{T} + N_e \tag{10}$$

$$\text{var}[\hat{N}_R] = \text{var}[\hat{T}] \tag{11}$$

where var (N_e) = 0 because N_e was an exact count.

The estimated fishery exploitation rate was calculated:

$$\hat{E} = \frac{\hat{T}}{\hat{N}_R} \tag{12}$$

$$\text{var}[\hat{E}] \approx \hat{E}^2 \left[\frac{\text{var}[\hat{T}]\, N_e{}^2}{\hat{N}_R^4}\right] \tag{13}$$

This variance (and equation 15 below) is an approximation from the delta method (Seber 1982).

The estimated survival rate of smolts to adults was calculated:

$$\hat{S} = \frac{\hat{N}_R}{\hat{N}_s} \tag{14}$$

$$\text{var}[\hat{S}] \approx \hat{S}^2 \left[\frac{\text{var}[\hat{N}_R]}{\hat{N}_R^2}\right] + \left[\frac{\text{var}[\hat{N}_S]}{\hat{N}_S^2}\right] \tag{15}$$

RESULTS

SMOLT TAGGING, AGE, LENGTH, AND WEIGHT

We captured a total of 13,302 coho salmon smolt ≥70 mm FL at the smolt trap from 28 April through 1 June 1999 (Table 3). Of those, 290 died after tagging and 56 were estimated to have shed their tags, leaving a total valid release of 12,956 tagged smolts. Age-1 coho smolt constituted 55% of sampled smolt and averaged 94.1mm in FL (SE = 9.0) and 8.0g (SE = 2.4) in weight. Age-2 fish averaged 115.0 mm in FL (SE = 8.5) and 14.1g (SE = 3.0) in weight.

CODED WIRE TAG RECOVERY

During random sampling of the sport and commercial fisheries in 2000, we recovered a total of 242 CWTs placed on coho salmon in Slippery Creek in 1999 (Appendix A1). The greatest number (135) of tags recovered were from the commercial troll fishery in the Northwest Quadrant on the outside coast (Table 4). Forty-three (43) CWTs were recovered in purse seine fisheries from District 109 (Chatham Strait/Frederick Sound), District 112 (Chatham Strait), and District 113 (the outer coast). Four tags were recovered in the marine recreational fishery around Sitka in July and August. One CWT was recovered in the gillnet fishery in District 106 (Sumner Strait/Clarence Strait). Coho salmon bearing Slippery Creek tags were recovered in the troll fishery throughout the season. Most traveled along the outer coast and entered inside waters around the southern tip of Baranof Island and into Chatham Strait before

Table 3.–Daily counts of coho salmon smolt caught and tagged at the Slippery Creek smolt trap during 1999.

Date	Total tagged	Overnight mortality	Live tagged	Retention rate	Valid tags
28-Apr	42	3	39	1.00	39
29-Apr	12	0	12	1.00	12
30-Apr	18	1	17	1.00	17
01-May	41	3	38	1.00	38
02-May	1	0	1	1.00	1
03-May	111	2	109	1.00	109
04-May	75	2	73	1.00	73
05-May	88	8	80	1.00	80
06-May	96	4	92	1.00	92
07-May	74	9	65	1.00	65
08-May	212	7	205	0.99	202
09-May	515	14	501	0.99	496
10-May	318	2	316	1.00	316
11-May	400	7	393	0.98	385
12-May	403	6	397	0.98	389
13-May	1,544	32	1,512	1.00	1,512
14-May	809	5	804	0.99	796
15-May	1,741	12	1,729	1.00	1,725
16-May	1,244	6	1,238	0.99	1,226
17-May	860	7	853	1.00	853
18-May	693	6	687	1.00	687
19-May	565	1	564	1.00	564
20-May	466	8	458	1.00	458
21-May	846	9	837	0.99	829
22-May	484	25	459	1.00	459
23-May	385	22	363	1.00	363
24-May	198	31	167	1.00	167
25-May	186	18	168	1.00	168
26-May	140	7	133	1.00	133
27-May	152	11	141	1.00	141
28-May	96	11	85	1.00	85
29-May	182	1	181	1.00	181
30-May	106	9	97	1.00	97
31-May	71	1	70	1.00	70
01-Jun	128	0	128	1.00	128
TOTAL	13,302	290	13,012		12,956

entering Port Camden during their spawning migration return (Figure 3).

SMOLT ABUNDANCE IN 1999

Systematic sampling procedures for adults were not selective ($\chi^2 = 1.18$, df = 2, p = 0.28) since CWTs were recovered in proportion to the numbers of smolt sampled (and tagged) by freshwater age (1. or 2.). In contrast, the numbers of smolt sampled at age were significantly different than the numbers of adults sampled at age ($\chi^2 = 13.0$, df = 2, p = 0.0003). The fraction of adults missing their adipose fin also varied significantly by age ($\chi^2 = 6.2$, df = 2, p = 0.013), demonstrating that a higher proportion of age 2. smolt was captured and tagged than age 1. smolt ($\theta_2 = 0.533$ vs $\theta_1 = 0.347$, Table 5). This may have resulted because the mesh size of the Vexar smolt trap panels was not small enough to block the passage of small smolt.

The total number of outmigrating coho salmon smolts ≥70mm from Slippery Creek in 1999 is estimated at 31,015 (SE = 2,766). Out of the 411 coho salmon inspected at the adult weir in the 2000 escapement, 149 were missing adipose fins and checked for the presence of a CWT; two fish were missing an adipose fin and determined not to have a CWT. Because the incidence of naturally missing adipose fins was assumed to be extremely small, the two fish with no tags were assumed to be Slippery Creek coho salmon that shed the coded wire tag.

HARVEST, EXPLOITATION AND ESCAPEMENT IN 2000

An estimated 2,193 (SE = 146) coho salmon originating from Slippery Creek were harvested in marine commercial and sport fisheries in 2000. The commercial troll fishery in the Northwest Quadrant took 57% of the estimated marine harvest and took 75.7% in all quadrants

Table 4.–Estimated marine harvest of adult coho salmon bound for the Slippery Creek in 2000. In fishing periods and fishing quadrants for which no CWT was recovered with the appropriate code, harvest was assumed to be zero. See text for an explanation of the notation.

TROLL FISHERY

Stat. week	Dates	Per.	Quad.	H	var[$\hat{H}$]	k	a	a'	t	t'	m_i	$\hat{r}$	SE[$\hat{r}$]	RP[$\hat{r}$]
19-33	7/3-8/12	3	NW	644,581	0	191,712	4,311	4,265	3,521	3,517	128	1,201	107	17.5%
19-33	7/3-8/12	3	NE	82,742	0	27,611	411	400	320	320	36	306	49	31.3%
19-33	7/3-8/12	3	SE	12,679	0	6,898	118	115	96	96	10	20	8	76.3%
19-33	7/3-8/12	3	SW	61,397	0	42,635	753	740	595	595	5	30	9	59.4%
34-38	8/13-9/16	4	NE	129,204	0	98,356	1,819	1,799	1,451	1,450	8	52	15	56.0%
34-38	8/13-9/16	4	NW	169,114	0	65,346	2,239	2,219	1,943	1,938	7	50	18	69.0%
Total troll fishery				1,099,717	0	432,558	9,651	9,538	7,926	7,916	194	1,659	121	14.3%

SPORT FISHERY

Biweek	Dates	Derby	Area	H	var[$\hat{H}$]	k	a	a'	t	t'	m_i	$\hat{r}$	SE[$\hat{r}$]	RP[$\hat{r}$]
15	7/20-8/2	No	Sitka	8,702	977,542	3,348	98	96	87	87	1	7	7	182.3%
16	8/3-8/16	No	Sitka	15,978	4,502,085	4,151	100	99	92	92	1	11	10	186.8%
17	8/17-8/30	No	Sitka	7,208	7,353,706	2,907	85	85	76	76	2	14	10	139.8%
Total sport fishery				31,888	12,833,333	10,406	283	280	255	255	4	32	16	96.9%

SEINE FISHERY

Stat. week	Dates	District	H	var[$\hat{H}$]	k	a	a'	t	t'	m_i	$\hat{r}$	SE[$\hat{r}$]	RP[$\hat{r}$]
31[a]	7/23-7/29	112	671	0	256	1	1	1	1	1	7	7	182.0%
32	7/30-8/5	112	3,249	0	1,356	21	21	17	17	2	13	9	127.8%
33	8/6-8/12	109	6,246	0	1,540	34	34	29	29	18	202	46	44.5%
33	8/6-8/12	112	9,496	0	2,065	24	23	18	18	2	27	18	133.3%
33	8/6-8/12	113	3,100	0	657	23	23	21	21	2	26	18	133.2%
34	8/13-8/19	109	6,566	0	838	12	12	10	10	7	151	56	72.6%
34	8/13-8/19	112	11,030	0	4,663	102	100	83	83	5	33	14	81.0%
35	8/20-8/26	109	2,835	0	1,154	14	14	12	12	4	27	13	90.6%
35	8/20-8/26	112	4,261	0	2,619	60	60	50	50	2	9	6	122.3%
Total seine fishery			47,454	0	15,148	291	288	241	241	43	495	80	31.6%

GILLNET FISHERY

Stat. week	Dates	District	H	var[$\hat{H}$]	k	a	a'	t	t'	m_i	$\hat{r}$	SE[$\hat{r}$]	RP[$\hat{r}$]
30	7/16-7/22	106	10,308	0	4,129	137	134	112	111	1	7	7	181.7%
Total all fisheries			1,185,424	12,833,333	462,241	10,362	10,240	8,534	8,523	242	2,193	146	13.0%

[a] Terminal fishery.

(Table 6). The seine fisheries in Chatham Strait (Districts 109, 112 and 113) took 22.5%. Harvests in these fisheries occurred from July through mid-September. The troll harvest was spread over a long period (July to Sept.), and the peak of the seine harvests occurred in August (Figure 4). Estimated harvest in the Sitka marine recreational fishery is 32 fish, using harvest and sampling data from Hubartt et al. (2000).

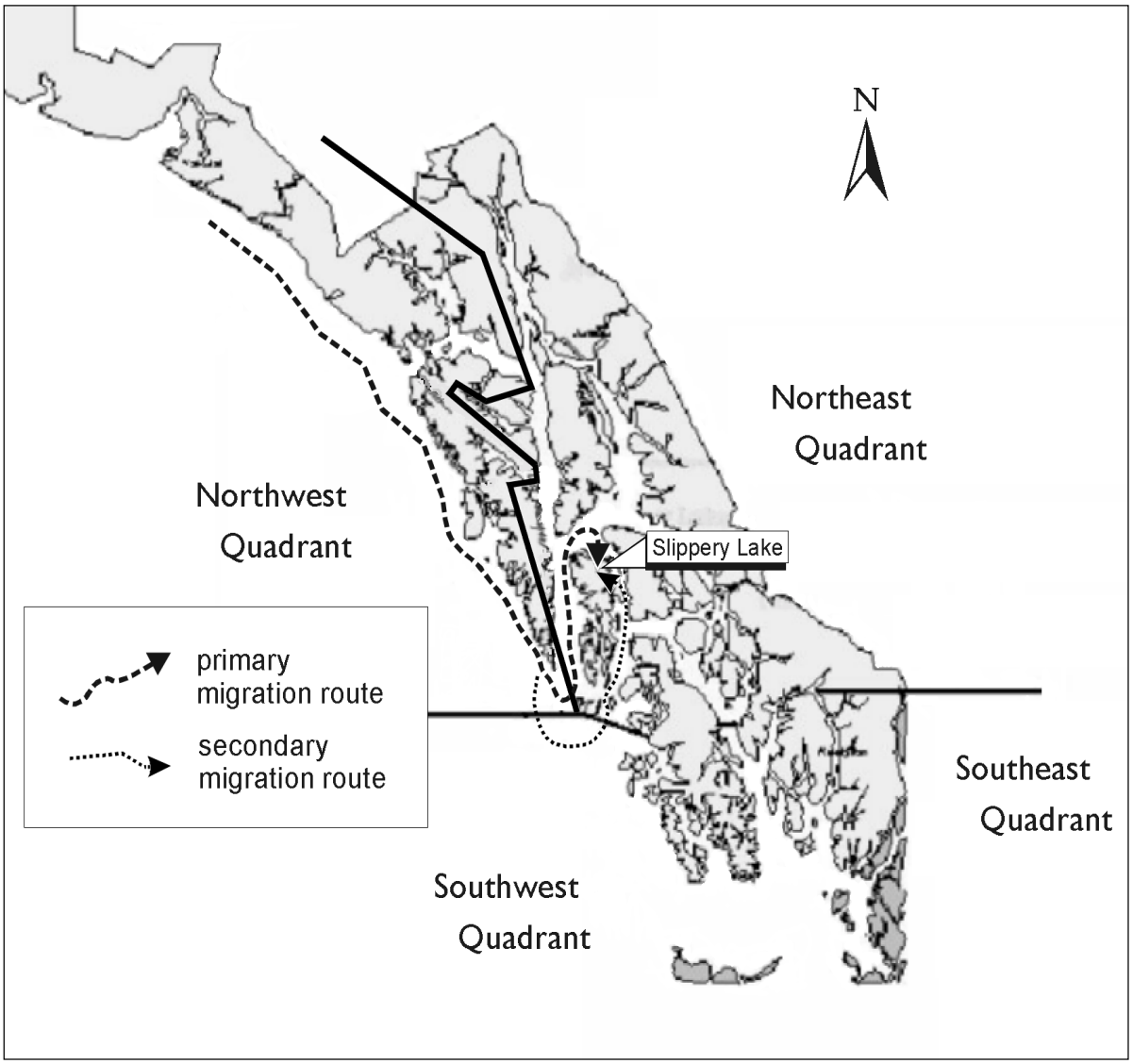

Figure 3.–Estimated harvest of coho salmon bound for Slippery Creek by marine commercial and recreational fisheries in 2000 by statistical week.

A total of 411 coho salmon returned to Slippery Creek in 2000 (Appendix A2). The total run (harvest plus escapement) was estimated to be 2,604 (SE = 146) adult coho salmon. The estimated marine survival rate was 8.4% (SE = 0.9%), and the estimated marine fishery exploitation rate was 84.2% (SE = 0.9). The mean length of age 1.1 adult coho salmon at Slippery Creek was 587 mm (SE = 50) mideye to fork of tail, and age 2.1 fish averaged 604 mm (SE = 45); 59.7% of the 278 adult fish sampled were females.

DISCUSSION

Results of this stock assessment program are assumed to be representative of similar systems in central inside waters of Southeast Alaska (SEAK). Relative recovery rates of CWTs from Slippery Creek are used as an inseason manage-

Table 5.–Mean fork length and age composition of coho salmon sampled from the smolt trap in 1999 and mean length and age composition of mature coho salmon sampled and age composition of the coded-wire-tagged portion of the escapement at the adult trap during 2000.

SMOLT SAMPLED IN 1999

	PARENT YEAR		
	1997 Age 1.0	1996 Age 2.0	Total
Number sampled	141	117	258
Mean length (mm)	94.1	115.0	103.4
SE	9.0	8.5	13.6
Percent composition	54.6%	45.4%	100%

ADULTS SAMPLED IN 2000

	PARENT YEAR		
	1997 Age 1.1	1996 Age 2.1	Total
Number sampled	147	60	207
Mean length (mm)	587.1	604.7	592.2
SE	50.0	45.9	67.9
Percent composition	71.0%	29.0%	100%
CWT sample	51	32	83
CWT composition	61.5%	38.5%	100%

ment tool to estimate run strength to the inside waters of SEAK. Because one-half of the Slippery Creek CWTs are recovered by early August, this stock provides good data for projections needed to meet the regions fishery management goals. Results from other systems (Taku River, Berners River and Auke Lake for northern inside SEAK, the Stikine River for central inside SEAK, Hugh Smith Lake and Unuk River for southern inside SEAK, Ford Arm, Nakwasina River and Salmon Lake for the outside coast) encompass the region's stock assessment program for coho salmon. Slippery Creek stock assessment has identified an area (District 109) in which wild coho stocks are exploited at much higher rates than typical inside stocks due to intensive seine fisheries in Chatham Strait during August. Removal rates are 54.2% for the seine fishery (Table 6).

The estimated marine exploitation rate (84.2%) is considered high; average exploitation rates on marked stocks by all fisheries in Southeast from 1990 to 1999 was 62% (Shaul 1998). Amongst the other coho salmon stocks listed above, the exploitation rate in 2000 was generally 50% or less; only Ford Arm showed an exploitation rate

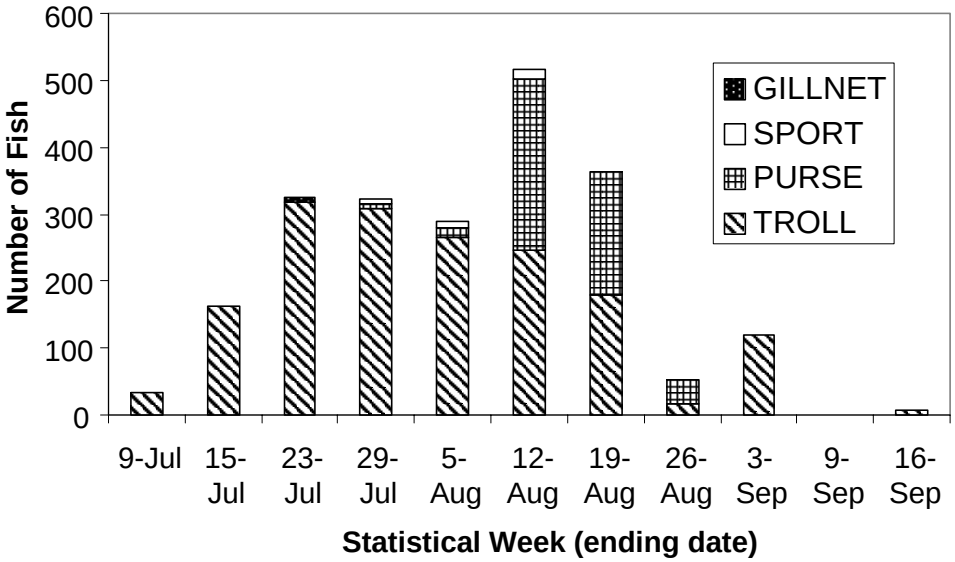

Figure 4.–Estimated harvest of coho salmon bound for Slippery Creek by marine commercial and recreational fisheries in 2000 by statistical week.

Table 6.–Estimated harvest, exploitation, and total run of Slippery Creek coho salmon in 2000.

Fishery	Area	Estimated harvest	SE	Percent of marine harvest	Percent of total run	Removal rate[a]
U.S. troll fishery	NW Quad	1,252	107	57.1	48.1	
	NE Quad	358	51	16.3	13.8	
	SW Quad	29	9	1.3	1.1	
	SE Quad	20	8	0.9	0.8	
	Subtotal	1,659	113	75.6	63.7	63.6%
Recreational	Sitka	32	16	1.5	1.2	3.4%
Seine fishery	Dist. 109	380	66	17.3	14.6	
	Dist. 112	89	24	4.1	3.4	
	Dist. 113	26	18	1.2	1.0	
	Subtotal	495	81	22.6	19.0	54.2%
Drift gillnet	Dist. 106	7	7	0.3	0.3	1.7%
Total marine harvest		2,193	146	100.0	84.2	
Escapement		411	0		15.8	
TOTAL RUN		2,604	146		100	

[a] Percent of available population harvested by a fishery.

near that estimated for Slippery Creek. The 1998 exploitation rate on the Slippery Creek stock was also high at 82.3% (Beers 1999). Forty-nine percent (49%) of the total adult run in 2000 was harvested in outside troll fisheries in the northwest and southwest quadrants before the fish moved into Chatham Strait around the southern tip of Baranof Island; another 34% was harvested by inside troll and seine fisheries in Chatham Strait/Frederick Sound (Figure 4). Fishery harvest data for other central Inside coho salmon systems for the 2000 adult return are not available, but central outside stocks Ford Arm (central Outside) and Hugh Smith Lake (southern Inside) had exploitation rates of 71.4% and 54.4%, respectively, in 2000 (L. Shaul, *unpublished data*). The estimated exploitation rate for coho salmon stock in the Nakwasina River (central Outside) was 37% (Brookover et al. *In prep.)*; the rate was 32.0% for the Taku River and 48.0% for the Unuk River (Jones et al. *In press).*

Estimated marine survival rate (8.4%) for the 2000 Slippery Creek adult return is similar to the 1998 return of 8.2%. This is lower than most estimates for other wild stocks in Southeast Alaska for which estimates were obtained for the 2000 adult return. Estimated marine survivals were 20.7% for Auke Lake, 11.8% for Berners River, and 6.6% for Hugh Smith Lake (L. Shaul, *unpublished data*), 8.0% for Taku River (S. McPherson *unpublished data*), and 3.8% for Unuk River (Jones et al. *In press*). The 2000 marine survival rate at Slippery Creek is considered moderate. Coho salmon in Southeast Alaska averaged 19.7% marine survival from 1990–1996 (Shaul 1998). Recent marine survival rate averages estimated for other coho salmon in Southeast Alaska were 25% for Auke Lake, Berners River 21%, Ford Arm 15%, and Hugh Smith Lake 17% for 1991–1994 (McPherson and Bernard 1996), but 10-year averages were 18% for Auke Lake, 11% for Ford Arm and 13% for Hugh Smith Lake (L. Shaul 1998). Taku River

marine survival averaged 16% for the 1993–1995 adult returns.

While the population in this experiment to estimate smolt abundance was not closed to losses from mortality, it was closed to recruitment, because salmon return to their natal stream to spawn. The stratified Peterson model we used to estimate smolt abundance at Slippery Creek assumed every smolt within an age class (1. or 2.) had an equal chance of being marked, or that every adult within an age class has an equal chance of being sampled, or that marked and unmarked fish within an age class mixed completely between sampling events. We believe that each of these assumptions are reasonable since differences in size at age are small (Table 5).

Escapement (411) and the estimate of total run (2,604) are biased slightly low, because a small number of adult fish likely passed by the trap site uncounted before 15 August and/or after 25 October. I believe the number of uncounted fish to be less than 25 and not enough to significantly change any of the results of this report.

In contrast to the experiment to estimate smolt abundance, sampling adults to estimate the fraction of the cohort marked with CWTs ($\hat{\theta}$) for the harvest study did not require stratifying the data by age, because any difference in marine survival based on age occurred before fish were harvested in the terminal areas, and sampling at the weir was not selective.

CONCLUSIONS AND RECOMMENDATIONS

Results from this project contribute to a long-term regionwide database useful for inseason and postseason assessment of run strength, adult production and developing adequate escapement goals. This investigation indicates that the Slippery Creek coho salmon run does serve as an indicator for run strength in central Inside waters. Coho salmon stock assessment also begun on the Stikine River in 2000 should provide additional information on central Inside stocks in the near future. Use of information from Slippery Creek and other stock indicators should be developed in management plans so that highly exploited stocks are properly identified inseason and actions taken to avoid overharvest during periods of low abundance. Since this project is intended to continue annually, we recommend some minor strategies to improve precision of smolt and adult parameter estimates at minimal cost. The size selectivity problem during the CWT portion of the project can be solved by tagging a higher proportion of the outmigration (>60%) and taking extra precautions to seal off even very small gaps in the weir to prevent small fish (age-1) from escaping the trap.

It is likely that CWT sampling rates in commercial and sport fisheries will continue to be in the 20–35% range; therefore, it is important that all adult coho salmon be inspected for adipose finclips in the fall.

ACKNOWLEDGMENTS

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APPENDIX A

Appendix A1.–Random recoveries of coded wire tagged coho salmon bound for Slippery Creek by date sampled in 2000.

SURVEY SITE	SAMPLE NUM	HEAD	SAMPLE TYPE	GEAR CLASS	DATE	STAT WEEK	PERIOD	QUAD	DISTRICT	TAG CODE
SITKA	30512	157453	R	TROLL	5-Jul-00	28	3	NW		45009
SITKA	30512	157455	R	TROLL	5-Jul-00	28	3	NW		45009
PETERSBURG	50332	502367	R	TROLL	6-Jul-00	28	3	NE	109	45009
PETERSBURG	50332	502368	R	TROLL	6-Jul-00	28	3	NE	109	45009
PORT ALEXANDER	80015	84865	R	TROLL	10-Jul-00	29	3	NE	109	45009
PELICAN	10048	164262	R	TROLL	10-Jul-00	29	3	NW	113	45009
SITKA	30578	157866	R	TROLL	11-Jul-00	29	3	NW	113	45009
SITKA	30592	157954	R	TROLL	11-Jul-00	29	3			45009
PETERSBURG	50388	502603	R	TROLL	12-Jul-00	29	3	NE	109	45009
SITKA	30597	135120	R	TROLL	12-Jul-00	29	3	NW	113	45009
SITKA	30595	157999	R	TROLL	12-Jul-00	29	3	NW	113	45009
SITKA	30597	135122	R	TROLL	12-Jul-00	29	3	NW	113	45009
SITKA	30588	157781	R	TROLL	12-Jul-00	29	3	NW	113	45009
SITKA	30594	157992	R	TROLL	12-Jul-00	29	3	NW	113	45009
SITKA	30593	157979	R	TROLL	12-Jul-00	29	3	NW	113	45009
SITKA	30608	135161	R	TROLL	13-Jul-00	29	3	NW	113	45009
SITKA	30609	135176	R	TROLL	13-Jul-00	29	3	NW	113	45009
KETCHIKAN	60209	67994	R	TROLL	14-Jul-00	29	3	SE	102	45009
KETCHIKAN	60208	66539	R	TROLL	14-Jul-00	29	3	SE	102	45009
HOONAH	110166	158487	R	TROLL	14-Jul-00	29	3	NW	113	45009
SITKA	30622	157576	R	TROLL	14-Jul-00	29	3	NW	154	45009
SITKA	30611	135194	R	TROLL	14-Jul-00	29	3	NW		45009
PELICAN	10056	164303	R	TROLL	15-Jul-00	29	3	NW	156	45009
HOONAH	110169	158504	R	TROLL	16-Jul-00	30	3	NW	113	45009
SITKA	30649	135401	R	TROLL	18-Jul-00	30	3	NW	113	45009
ELFIN COVE	20070	147886	R	TROLL	18-Jul-00	30	3	NW	114	45009
KETCHIKAN	60239	507049	R	TROLL	18-Jul-00	30	3	SW		45009
KETCHIKAN	60251	507362	R	DRIFT	19-Jul-00	30		SE	106	45009
SITKA	30665	135456	R	TROLL	19-Jul-00	30	3	NW	113	45009
SITKA	30664	135442	R	TROLL	19-Jul-00	30	3	NW	113	45009
SITKA	30662	135375	R	TROLL	19-Jul-00	30	3	NW	113	45009
SITKA	30666	135458	R	TROLL	19-Jul-00	30	3	NW	113	45009
SITKA	30664	135438	R	TROLL	19-Jul-00	30	3	NW	113	45009
SITKA	30664	135453	R	TROLL	19-Jul-00	30	3	NW	113	45009
YAKUTAT	140012	142500	R	TROLL	19-Jul-00	30	3	NW	189	45009
KETCHIKAN	60268	507707	R	TROLL	20-Jul-00	30	3	SW	103	45009
SITKA	30674	135029	R	TROLL	20-Jul-00	30	3	NW	113	45009
SITKA	30674	135035	R	TROLL	20-Jul-00	30	3	NW	113	45009
SITKA	30674	135036	R	TROLL	20-Jul-00	30	3	NW	113	45009
SITKA	30684	135568	R	TROLL	20-Jul-00	30	3	NW	113	45009
HOONAH	110173	158564	R	TROLL	20-Jul-00	30	3	NW	113	45009
PELICAN	10065	164361	R	TROLL	20-Jul-00	30	3	NW	156	45009
EXCURSION INLET	100051	500665	R	TROLL	20-Jul-00	30	3	NW		45009
SITKA	30672	135009	R	TROLL	20-Jul-00	30	3	NW		45009
EXCURSION INLET	100051	500662	R	TROLL	20-Jul-00	30	3	NW		45009
PORT ALEXANDER	80049	84900	R	TROLL	21-Jul-00	30	3	NW	113	45009
SITKA	30693	135593	R	TROLL	21-Jul-00	30	3	NW	113	45009
SITKA	30693	135591	R	TROLL	21-Jul-00	30	3	NW	113	45009
SITKA	30698	135622	R	TROLL	21-Jul-00	30	3	NW	113	45009
SITKA	30695	135916	R	TROLL	21-Jul-00	30	3	NW	154	45009
PELICAN	10069	164403	R	TROLL	21-Jul-00	30	3	NW	156	45009
SITKA	30689	135063	R	TROLL	21-Jul-00	30	3	NW		45009
PORT ALEXANDER	80057	83208	R	TROLL	22-Jul-00	30	3	NE	109	45009
PORT ALEXANDER	80058	83214	R	TROLL	22-Jul-00	30	3	NE	109	45009
PORT ALEXANDER	80059	83218	R	TROLL	22-Jul-00	30	3	NW	113	45009
SITKA	30708	135951	R	TROLL	22-Jul-00	30	3	NW	113	45009
PELICAN	10071	164420	R	TROLL	22-Jul-00	30	3	NW	113	45009
PELICAN	10071	164419	R	TROLL	22-Jul-00	30	3	NW	113	45009
HOONAH	110176	158596	R	TROLL	22-Jul-00	30	3	NW	116	45009
HOONAH	110174	158575	R	TROLL	22-Jul-00	30	3	NW	116	45009
EXCURSION INLET	100057	500689	R	TROLL	22-Jul-00	30	3	NW		45009
PORT ALEXANDER	80068	83230	R	TROLL	23-Jul-00	31	3	NE	109	45009
SITKA	30709	135953	R	TROLL	23-Jul-00	31	3	NW	113	45009
HOONAH	110178	158225	R	TROLL	23-Jul-00	31	3	NW	113	45009
HOONAH	110180	158615	R	TROLL	23-Jul-00	31	3	NW	113	45009
HOONAH	110178	158282	R	TROLL	23-Jul-00	31	3	NW	113	45009
HOONAH	110180	158290	R	TROLL	23-Jul-00	31	3	NW	113	45009
ELFIN COVE	20086	163506	R	TROLL	24-Jul-00	31	3	NW	114	45009
CRAIG	70273	159578	R	TROLL	25-Jul-00	31	3	SW	104	45009
PETERSBURG	50581	502773	R	TROLL	25-Jul-00	31	3	SE	105	45009
PORT ALEXANDER	80075	83241	R	TROLL	25-Jul-00	31	3	NE	109	45009
SITKA	30724	135756	R	TROLL	25-Jul-00	31	3	NW	113	45009
SITKA	30719	135736	R	TROLL	25-Jul-00	31	3	NW	113	45009
PELICAN	10080	164486	R	TROLL	25-Jul-00	31	3	NW	116	45009
SITKA	30744	154284	R	TROLL	25-Jul-00	31	3			45009

-continued-

Appendix A1.–Page 2 of 4.

SURVEY SITE	SAMPLE NUM	HEAD	SAMPLE TYPE	GEAR CLASS	DATE	STAT WEEK	PERIOD	QUAD	DISTRICT	TAG CODE
SITKA	30744	154230	R	TROLL	25-Jul-00	31	3			45009
SITKA	30744	154282	R	TROLL	25-Jul-00	31	3			45009
SITKA	30744	154232	R	TROLL	25-Jul-00	31	3			45009
SITKA	35317	149537	R	SPORT	25-Jul-00	31		NW	113	45009
CRAIG	70280	159883	R	TROLL	26-Jul-00	31	3	SW	103	45009
SITKA	30729	135680	R	TROLL	26-Jul-00	31	3	NW	113	45009
SITKA	30737	154302	R	TROLL	26-Jul-00	31	3	NW	113	45009
SITKA	30737	135785	R	TROLL	26-Jul-00	31	3	NW	113	45009
PELICAN	10081	164498	R	TROLL	26-Jul-00	31	3	NW	116	45009
PELICAN	10083	164508	R	TROLL	26-Jul-00	31	3	NW		45009
PETERSBURG	50627	502621	R	PURSE	27-Jul-00	31		NE	112	45009
PORT ALEXANDER	80084	83259	R	TROLL	27-Jul-00	31	3	NE	109	45009
SITKA	30750	157203	R	TROLL	27-Jul-00	31	3	NW	113	45009
SITKA	30752	157216	R	TROLL	27-Jul-00	31	3	NW	113	45009
PELICAN	10086	164530	R	TROLL	27-Jul-00	31	3	NW	113	45009
SITKA	30741	135998	R	TROLL	27-Jul-00	31	3	NW	154	45009
PETERSBURG	50636	502737	R	TROLL	28-Jul-00	31	3	NE	109	45009
SITKA	30765	154390	R	TROLL	28-Jul-00	31	3	NW	113	45009
SITKA	30761	154357	R	TROLL	28-Jul-00	31	3	NW	113	45009
SITKA	30763	154372	R	TROLL	28-Jul-00	31	3	NW	113	45009
SITKA	30763	154374	R	TROLL	28-Jul-00	31	3	NW	113	45009
SITKA	30781	154121	R	TROLL	29-Jul-00	31	3	NW	113	45009
HOONAH	110186	158702	R	TROLL	29-Jul-00	31	3	NW	113	45009
SITKA	30783	154152	R	TROLL	29-Jul-00	31	3	NW	113	45009
CRAIG	70313	159305	R	TROLL	30-Jul-00	32	3	SW	104	45009
PELICAN	10091	164608	R	TROLL	30-Jul-00	32	3	NW		45009
PELICAN	10091	164591	R	TROLL	30-Jul-00	32	3	NW		45009
PELICAN	10091	164593	R	TROLL	30-Jul-00	32	3	NW		45009
SITKA	30818	154509	R	TROLL	30-Jul-00	32	3			45009
SITKA	30818	154541	R	TROLL	30-Jul-00	32	3			45009
SITKA	30818	154556	R	TROLL	30-Jul-00	32	3			45009
SITKA	30818	154513	R	TROLL	30-Jul-00	32	3			45009
EXCURSION INLET	100079	500536	R	PURSE	31-Jul-00	32		NE	112	45009
EXCURSION INLET	100081	500537	R	PURSE	31-Jul-00	32		NE	112	45009
SITKA	30804	157397	R	TROLL	31-Jul-00	32	3	NW	113	45009
SITKA	30804	157390	R	TROLL	31-Jul-00	32	3	NW	113	45009
SITKA	30804	157398	R	TROLL	31-Jul-00	32	3	NW	113	45009
SITKA	35384	149573	R	SPORT	31-Jul-00	32		NW	113	45009
PORT ALEXANDER	80104	83296	R	TROLL	1-Aug-00	32	3	NE	109	45009
PORT ALEXANDER	80104	83300	R	TROLL	1-Aug-00	32	3	NE	109	45009
SITKA	30811	154439	R	TROLL	1-Aug-00	32	3	NW	113	45009
SITKA	30810	154434	R	TROLL	1-Aug-00	32	3	NW	113	45009
JUNEAU	40079	500067	R	TROLL	2-Aug-00	32	3	NW	113	45009
JUNEAU	40078	55559	R	TROLL	2-Aug-00	32	3	NW	113	45009
HOONAH	110194	158806	R	TROLL	2-Aug-00	32	3	NW	113	45009
SITKA	30813	154444	R	TROLL	2-Aug-00	32	3	NW	154	45009
SITKA	30813	154449	R	TROLL	2-Aug-00	32	3	NW	154	45009
CRAIG	70350	159250	R	TROLL	3-Aug-00	32	3	SE	105	45009
PORT ALEXANDER	80114	83714	R	TROLL	3-Aug-00	32	3	NE	109	45009
CRAIG	70371	509002	R	TROLL	4-Aug-00	32	3	SW	103	45009
SITKA	30827	154584	R	TROLL	4-Aug-00	32	3	NW	113	45009
PELICAN	10101	164720	R	TROLL	4-Aug-00	32	3	NW	113	45009
EXCURSION INLET	100071	501115	R	TROLL	4-Aug-00	32	3	NW		45009
EXCURSION INLET	100071	501107	R	TROLL	4-Aug-00	32	3	NW		45009
CRAIG	70381	509027	R	TROLL	5-Aug-00	32	3	SW	104	45009
PORT ALEXANDER	80118	83729	R	TROLL	5-Aug-00	32	3	NE	109	45009
PORT ALEXANDER	80118	83730	R	TROLL	5-Aug-00	32	3	NE	109	45009
KETCHIKAN	60397	508980	R	TROLL	5-Aug-00	32	3	SW		45009
PETERSBURG	50715	502823	R	PURSE	6-Aug-00	33				45009
SITKA	30857	154619	R	TROLL	6-Aug-00	33	4	NW	113	45009
PETERSBURG	50748	502893	R	PURSE	7-Aug-00	33		NE	109	45009
SITKA	30861	154485	R	PURSE	7-Aug-00	33		NW	113	45009
PETERSBURG	50747	502897	R	PURSE	7-Aug-00	33				45009
SITKA	30855	154475	R	TROLL	7-Aug-00	33	4	NW	113	45009
PELICAN	10111	164772	R	TROLL	7-Aug-00	33	4	NW	113	45009
HOONAH	110203	158905	R	TROLL	7-Aug-00	33	4	NW	113	45009
HOONAH	110203	158901	R	TROLL	7-Aug-00	33	4	NW	113	45009
HOONAH	110205	158936	R	TROLL	7-Aug-00	33	4	NW	113	45009
PETERSBURG	50732	502872	R	PURSE	8-Aug-00	33		NE	109	45009
PETERSBURG	50732	502873	R	PURSE	8-Aug-00	33		NE	109	45009
PETERSBURG	50746	502826	R	PURSE	8-Aug-00	33		NE	109	45009
PETERSBURG	50746	502824	R	PURSE	8-Aug-00	33		NE	109	45009
PORT ALEXANDER	80129	83749	R	TROLL	9-Aug-00	33	4	NE	109	45009
PORT ALEXANDER	80129	83746	R	TROLL	9-Aug-00	33	4	NE	109	45009
EXCURSION INLET	100090	500759	R	TROLL	9-Aug-00	33	4	NW		45009
PETERSBURG	50769	502837	R	PURSE	10-Aug-00	33		NE	109	45009

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SURVEY SITE	SAMPLE NUM	HEAD	SAMPLE TYPE	GEAR CLASS	DATE	STAT WEEK	PERIOD	QUAD	DISTRICT	TAG CODE
PETERSBURG	50769	502836	R	PURSE	10-Aug-00	33		NE	109	45009
PORT ALEXANDER	80133	83755	R	TROLL	10-Aug-00	33	4	NE	109	45009
PETERSBURG	50767	502975	R	TROLL	10-Aug-00	33	4	NE	109	45009
PETERSBURG	50768	502963	R	TROLL	10-Aug-00	33	4	NE	109	45009
PETERSBURG	50768	502967	R	TROLL	10-Aug-00	33	4	NE	109	45009
PETERSBURG	50768	502962	R	TROLL	10-Aug-00	33	4	NE	109	45009
PETERSBURG	50768	502965	R	TROLL	10-Aug-00	33	4	NE	109	45009
PETERSBURG	50768	502966	R	TROLL	10-Aug-00	33	4	NE	109	45009
PETERSBURG	50765	502974	R	TROLL	10-Aug-00	33	4			45009
PETERSBURG	50771	502846	R	PURSE	11-Aug-00	33		NE	109	45009
PETERSBURG	50796	503069	R	PURSE	11-Aug-00	33		NE	109	45009
PETERSBURG	50796	503071	R	PURSE	11-Aug-00	33		NE	109	45009
EXCURSION INLET	100097	500786	R	PURSE	11-Aug-00	33		NE	112	45009
PORT ALEXANDER	80141	83769	R	TROLL	11-Aug-00	33	4	NE	109	45009
EXCURSION INLET	100096	500794	R	TROLL	11-Aug-00	33	4	NW		45009
EXCURSION INLET	100096	501151	R	TROLL	11-Aug-00	33	4	NW		45009
PETERSBURG	50784	503053	R	PURSE	12-Aug-00	33		NE	109	45009
PETERSBURG	50784	503058	R	PURSE	12-Aug-00	33		NE	109	45009
PETERSBURG	50784	503055	R	PURSE	12-Aug-00	33		NE	109	45009
PETERSBURG	50784	503059	R	PURSE	12-Aug-00	33		NE	109	45009
PETERSBURG	50784	503052	R	PURSE	12-Aug-00	33		NE	109	45009
PETERSBURG	50789	503004	R	PURSE	12-Aug-00	33		NE	109	45009
PETERSBURG	50787	503001	R	PURSE	12-Aug-00	33		NE	109	45009
PETERSBURG	50793	503008	R	PURSE	12-Aug-00	33				45009
PETERSBURG	50775	502981	R	TROLL	12-Aug-00	33	4	NE	109	45009
PETERSBURG	50772	502978	R	TROLL	12-Aug-00	33	4	NE	109	45009
SITKA	30885	154800	R	TROLL	12-Aug-00	33	4	NW	113	45009
SITKA	30885	154797	R	TROLL	12-Aug-00	33	4	NW	113	45009
PETERSBURG	50776	502983	R	TROLL	12-Aug-00	33	4	NE		45009
PETERSBURG	50776	502982	R	TROLL	12-Aug-00	33	4	NE		45009
PETERSBURG	50776	502984	R	TROLL	12-Aug-00	33	4	NE		45009
SITKA	30946	155245	R	TROLL	12-Aug-00	33	4	NW		45009
KETCHIKAN	69995	508487	R	TROLL	12-Aug-00	33	4			45009
PETERSBURG	50808	503153	R	TROLL	13-Aug-00	34	4	NE	109	45009
SITKA	30909	154830	R	TROLL	13-Aug-00	34	4	NW	113	45009
PELICAN	10134	164902	R	TROLL	13-Aug-00	34	4	NW	113	45009
PELICAN	10127	164858	R	TROLL	13-Aug-00	34	4	NW	113	45009
SITKA	30916	154875	R	TROLL	13-Aug-00	34	4	NW	113	45009
SITKA	30926	154985	R	TROLL	13-Aug-00	34	4	NW	154	45009
PETERSBURG	50809	502998	R	TROLL	13-Aug-00	34	4	NE		45009
PETERSBURG	50809	502997	R	TROLL	13-Aug-00	34	4	NE		45009
SITKA	30905	154678	R	TROLL	13-Aug-00	34	4			45009
SITKA	30905	154683	R	TROLL	13-Aug-00	34	4			45009
PETERSBURG	50811	503173	R	TROLL	14-Aug-00	34	4	NE	109	45009
SITKA	30942	155123	R	TROLL	14-Aug-00	34	4	NW	113	45009
SITKA	30934	155201	R	TROLL	14-Aug-00	34	4	NW	113	45009
SITKA	30934	154900	R	TROLL	14-Aug-00	34	4	NW	113	45009
SITKA	30929	155332	R	TROLL	14-Aug-00	34	4	NW	113	45009
SITKA	30941	155120	R	TROLL	14-Aug-00	34	4	NW	113	45009
EXCURSION INLET	100104	501182	R	TROLL	14-Aug-00	34	4	NW		45009
EXCURSION INLET	100104	501176	R	TROLL	14-Aug-00	34	4	NW		45009
EXCURSION INLET	100104	500932	R	TROLL	14-Aug-00	34	4	NW		45009
EXCURSION INLET	100104	500905	R	TROLL	14-Aug-00	34	4	NW		45009
JUNEAU	40089	500081	R	TROLL	14-Aug-00	34	4	NW		45009
PETERSBURG	50833	503091	R	PURSE	15-Aug-00	34		NE	109	45009
EXCURSION INLET	100106	500954	R	PURSE	15-Aug-00	34		NE	112	45009
PETERSBURG	50859	503074	R	PURSE	16-Aug-00	34		NE	109	45009
PETERSBURG	50859	503075	R	PURSE	16-Aug-00	34		NE	109	45009
PETERSBURG	50859	503076	R	PURSE	16-Aug-00	34		NE	109	45009
PETERSBURG	50847	503088	R	PURSE	16-Aug-00	34		NE	109	45009
PETERSBURG	50847	503089	R	PURSE	16-Aug-00	34		NE	109	45009
PETERSBURG	50847	503087	R	PURSE	16-Aug-00	34		NE	109	45009
EXCURSION INLET	100108	501506	R	PURSE	16-Aug-00	34		NE	112	45009
EXCURSION INLET	100110	500990	R	PURSE	16-Aug-00	34		NE	112	45009
EXCURSION INLET	109997	501515	R	PURSE	19-Aug-00	34		NE	112	45009
EXCURSION INLET	100119	501663	R	PURSE	19-Aug-00	34		NE	112	45009
PETERSBURG	50884	503095	R	PURSE	20-Aug-00	35		NE	109	45009
PETERSBURG	50889	503098	R	PURSE	20-Aug-00	35		NE	109	45009
SITKA	35485	169410	R	SPORT	20-Aug-00	35		NW	113	45009
PETERSBURG	50902	503205	R	PURSE	23-Aug-00	35		NE	109	45009
EXCURSION INLET	100126	501586	R	PURSE	23-Aug-00	35		NE	112	45009
EXCURSION INLET	100126	501572	R	PURSE	23-Aug-00	35		NE	112	45009
PETERSBURG	50917	502935	R	PURSE	24-Aug-00	35		NE	109	45009
SITKA	35515	149635	R	SPORT	24-Aug-00	35		NW	113	45009
SITKA	30964	156055	R	TROLL	25-Aug-00	35	5	NW	113	45009
SITKA	30972	155435	R	TROLL	26-Aug-00	35	5	NW		45009
PETERSBURG	50941	503130	R	TROLL	27-Aug-00	36	5	NE	109	45009
SITKA	30996	155700	R	TROLL	27-Aug-00	36	5	NW		45009
SITKA	30996	155682	R	TROLL	27-Aug-00	36	5	NW		45009
PETERSBURG	50950	503245	R	TROLL	28-Aug-00	36	5	NE	109	45009
CRAIG	70511	179211	R	TROLL	28-Aug-00	36	5	NE	109	45009

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SURVEY SITE	SAMPLE NUM	HEAD	SAMPLE TYPE	GEAR CLASS	DATE	STAT WEEK	PERIOD	QUAD	DISTRICT	TAG CODE
PETERSBURG	50946	503134	R	TROLL	28-Aug-00	36	5	NE	109	45009
PETERSBURG	50946	503138	R	TROLL	28-Aug-00	36	5	NE	109	45009
SITKA	31007	154022	R	TROLL	28-Aug-00	36	5	NW	113	45009
PETERSBURG	50975	503363	R	TROLL	29-Aug-00	36	5	NE	109	45009
PETERSBURG	50980	503257	R	TROLL	30-Aug-00	36	5	NE	109	45009
PETERSBURG	50979	503263	R	TROLL	30-Aug-00	36	5	NE	109	45009
PETERSBURG	50978	503264	R	TROLL	30-Aug-00	36	5	NE	109	45009
PETERSBURG	50988	503273	R	TROLL	1-Sep-00	36	5	NE	109	45009
EXCURSION INLET	100137	501489	R	TROLL	1-Sep-00	36	5	NW		45009
SITKA	31077	156201	R	TROLL	11-Sep-00	38	6	NW	113	45009

Appendix A2.–Daily counts of adult coho salmon with and without adipose finclips immigrating past the Slippery Creek adult weir in 2000.

Date	Daily count of large coho [a]	Cumulative count of large coho [a]	Daily adipose finclips	Cumulative adipose finclips	Percent adipose clipped
15-Aug	0	0	0	0	-
16-Aug	0	0	0	0	-
17-Aug	0	0	0	0	-
18-Aug	3	3	1	1	33%
19-Aug	3	6	1	2	33%
20-Aug	2	8	0	2	25%
21-Aug	21	29	9	11	38%
22-Aug	0	29	0	11	38%
23-Aug	32	61	6	17	28%
24-Aug	21	82	8	25	30%
25-Aug	14	96	8	33	34%
26-Aug	3	99	1	34	34%
27-Aug	3	102	1	35	34%
28-Aug	6	108	3	38	35%
29-Aug	10	118	1	39	33%
30-Aug	28	146	10	49	34%
31-Aug	1	147	1	50	34%
1-Sep	0	147	0	50	34%
2-Sep	0	147	0	50	34%
3-Sep	0	147	0	50	34%
4-Sep	0	147	0	50	34%
5-Sep	70	217	27	77	35%
6-Sep	7	224	5	82	37%
7-Sep	0	224	0	82	37%
8-Sep	12	236	7	89	38%
9-Sep	15	251	4	93	37%
10-Sep	0	251	0	93	37%
11-Sep	59	310	20	113	36%
12-Sep	54	364	20	133	37%
13-Sep	5	369	1	134	36%
14-Sep	0	369	0	134	36%
15-Sep	13	382	3	137	36%
16-Sep	0	382	0	137	36%
17-Sep	0	382	0	137	36%
18-Sep	19	401	10	147	37%
19-Sep	3	404	1	148	37%
20-Sep	1	405	0	148	37%
21-Sep	0	405	0	148	37%
22-Sep	0	405	0	148	37%
23-Sep	0	405	0	148	37%
24-Sep	0	405	0	148	37%
25-Sep	0	405	0	148	37%
26-Sep	0	405	0	148	37%
27-Sep	0	405	0	148	37%
28-Sep	0	405	0	148	37%
29-Sep	5	410	1	149	36%
30-Sep	0	410	0	149	36%
1-Oct	0	410	0	149	36%
2-Oct	0	410	0	149	36%
3-Oct	0	410	0	149	36%
4-Oct	0	410	0	149	36%
5-Oct	0	410	0	149	36%

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Date	Daily count of large coho [a]	Cumulative count of large coho [a]	Daily adipose finclips	Cumulative adipose finclips	Percent adipose clipped
6-Oct	0	410	0	149	36%
7-Oct	0	410	0	149	36%
8-Oct	0	410	0	149	36%
9-Oct	0	410	0	149	36%
10-Oct	0	410	0	149	36%
11-Oct	0	410	0	149	36%
12-Oct	0	410	0	149	36%
13-Oct	0	410	0	149	36%
14-Oct	0	410	0	149	36%
15-Oct	0	410	0	149	36%
16-Oct	0	410	0	149	36%
17-Oct	0	410	0	149	36%
18-Oct	0	410	0	149	36%
19-Oct	0	410	0	149	36%
20-Oct	0	410	0	149	36%
21-Oct	0	410	0	149	36%
22-Oct	0	410	0	149	36%
23-Oct	0	410	0	149	36%
24-Oct	0	410	0	149	36%
25-Oct	1	411	0	149	36%

[a] >16 inches total length.

Appendix A3.–Computer data file on 1999 Slippery Creek coho salmon smolt and subsequent estimates of 2000 Slippery Creek adult coho salmon run parameters.

File name	Description
SLIP19992000MOD.XLS	Excel spreadsheet computing smolt production, marine harvest, exploitation, age composition, and marine survival.